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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/054,826	01/23/2002	John Wasserbauer	47321/PAN/C715	7783

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EXAMINER	
FLORES RUIZ, DELMA R	
ART UNIT	**PAPER NUMBER**
2828	

DATE MAILED: 12/05/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

Office Action Summary	Application N .	Applicant(s)
	10/054,826	WASSERBAUER, JOHN10054826
	Examiner	Art Unit
	Delma R. Flores Ruiz	2828 AW

-- The MAILING DATE of this communication appears on the cover sheet with the correspondenc address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 September 2003*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-28* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-28* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Paul Ip

PAUL IP
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1 – 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jewell et al (5,719,894) in view of Hou et al (6,258,615).

Regarding claim 1, Jewell disclose a surface emitting laser, comprising; an active region (see Fig. 9a – 10b Character 110), comprising a plurality of quantum wells (see Fig. 9b and 10b Character 16, and 128), formed between first mirror (see Fig. 9aCharacter 102) and second mirror (see Fig. 9a Character 116), (Figs. 1 – 11, Column 6,Lines 38 – 58, Column 35, Lines 35 – 68, and Column 36, Lines 39 – 68). It would have been obvious at the time of applicant's invention, to combine Hou of teaching a gain of each of said quantum wells is optimized to operate quasi-independently at different temperatures such that stimulated emission is dominated by a different quantum well at different temperature with surface emitting laser because the

gain of each of said quantum wells is optimized to operate quasi-independently at different temperatures such that stimulated emission is dominated by a different quantum well at different temperature since all the lasers with a large wavelength span share the same active region of the quantum wells, the optimum operating temperature for each element is very different. These results in a very narrow temperature region of the quantum wells, the optimum operating temperature for each element is very different. This results in a very narrow temperature region within which the operation of all the lasers can be achieved.

Regarding claims 2, 23, 27, Jewell disclose a thickness of said quantum wells varies from well to well so that transition energy and thereof gain peak wavelength varies from well to well or between groups of wells (Abstract, Column 16, Lines 16 –34, Column 17, Lines 19 – 29, and Column 19, Lines 26 - 46)

Regarding claim 3, Jewell disclose a material composition of said wells varies from well to wells to provide varying conduction and valence offset between the quantum wells and associated barriers layer (Column 16, Lines 56 – 64).

Regarding claim 4, Jewell disclose an active region (see Fig. 9b and 10b, Character 110) further comprises a barrier layer (see Fig. 9b and 10b, Character 54' and 70') sandwiched between each of said quantum wells, wherein thickness of said

barrier layers varies from barrier to barrier so that transition energy and therefore gain peak wavelength varies from well to well (Figs. 1 – 11, Column 6,Lines 38 – 58, Column 35, Lines 35 – 68, and Column 36, Lines 39 – 68).

Regarding claim 5, Jewell disclose an active region (see Fig. 9b and 10b, Character 110) further comprises a barrier layer (see Fig. 9b and 10b, Character 54' and 70') sandwiched between each of said quantum wells, wherein material composition of said barrier layer varies to barrier so that transition energy and therefore gain peak wavelength varies from well to well or between groups of wells (Figs. 1 – 11, Abstract, Column 6, Lines 38 – 58, Column 16, Lines 16 –34, Column 17, Lines 19 – 29, and Column 19, Lines 26 - 46, Column 35, Lines 35 – 68, and Column 36, Lines 39 – 68).

Regarding claim 6 Jewell disclose a material composition of said quantum wells varies from well to well to induce varying levels of stain from quantum well to quantum well to provide varying conduction and valence band offset between the quantum wells and associated barrier layers, Column 16, Lines 16 –34, Column 17, Lines 19 – 29, and Column 19, Lines 26 - 46, Column 35, Lines 35 – 68, and Column 36, Lines 39 – 68).

Regarding claim 7 and 8, Jewell disclose a quantum wells are gain matched such that the fraction of carries contributing to stimulated emission is substantially

constant over temperature and wherein thickness of said quantum wells decreases from well to well, such that each well operate at roughly the same internal efficiency η_I at different temperature (See Figs. 1 – 11, and Column 16, Lines 56 – 64).

Regarding claim 9 Jewell, discloses an active region (see Fig. 9a – 10b Character 110) further comprises a barrier layer (see Fig. 9b and 10b Character 54' and 70') sandwiched between each of said quantum wells, wherein material composition of said barrier layer varies from barrier layer to barrier layer, so that the barrier layer with greatest band offset provides majority of gain at a high operating temperature and the barrier layer with lowest ban offset provides majority of gain a low operating temperature (Figs. 1 – 11, Column 6, Lines 38 – 58, Column 16, Lines 56 – 64, Column 35, Lines 35 – 68, and Column 36, Lines 39 – 68).

Regarding claim 10 Jewell discloses a material composition of said quantum well varies from well to well to provide varying conduction and valence band offset between the quantum wells and associated barrier layers such that each well operate at roughly the same η_I and η at different temperature (See Figs. 1 – 11, and Column 16, Lines 56 – 64).

Regarding claim 11, Jewell disclose material composition of said quantum well varies from well to well to induce varying levels of strain from quantum well to quantum

well such that quantum wells with the highest strain provides majority of gain at a high operating temperature and quantum well with lowest strain provides majority of gain at a low operating temperature (Figs. 1 – 11, Column 6,Lines 38 – 58, Column 35, Lines 35 – 68, and Column 36, Lines 39 – 68).

Regarding claim 12, Jewell disclose a first group of wells comprising a first number to wells provides majority of gain at a high operating temperature and a second group of wells comprising a second number of wells provides majority of gain at a low operating temperature and wherein the first number of wells id grater that the second number of wells (see Figs. 1 – 11).

Regarding claim 13, Jewell disclose optical confinement factor varies from well to well levels such that the quantum well having largest optical confinement factor provides majority of gain at high operating temperature and the quantum well having the smallest optical confinement factor provides majority of gain a low operating temperature (Figs. 1 – 11, Column 6,Lines 38 – 58, Column 35, Lines 35 – 68, and Column 36, Lines 39 – 68).

Regarding claim 14, Jewell disclose a laser further comprises and anode for injecting holes into said active region and wherein the quantum well that supplies

majority of gain at a high operating temperature is closet to said anode and wherein the quantum well that supplies majority of gain at a low operating temperature is further from said anode (Figs. 1 – 11, Column 6,Lines 38 – 58, Column 35, Lines 35 – 68, and Column 36, Lines 39 – 68).

Regarding claim 15, Jewell disclose a level of non-radioactive recombination centers varies from well to well, and wherein the quantum well with least number of non-radioactive recombination centers provides majority of gain at a high operating temperature and the quantum well with the most non-radioactive recombination centers provides majority of gain at a low operating temperature (Figs. 1 – 11, Column 6,Lines 38 – 58, Column 35, Lines 35 – 68, and Column 36, Lines 39 – 68).

Regarding claim 16, Jewell disclose a method for forming an extended temperature range vertical cavity surface emitting laser (VCSEL), comprising the steps of: forming a first mirror (see Fig. 9a, Character 102); forming an active region (see Fig. 9a – 10b, Character 110) on said first mirror, said active region being configured to provide a substantially constant stimulated emission at a cavity wavelength over an extended temperature range without external temperature compensation, and wherein said quantum wells are gained matched such that fraction of carrier that contribute to stimulated emission is substantially constant over temperature and forming a second mirror (see Fig. 9a Character 116) on said active region (Figs. 1 – 11, Column 6,Lines

38 – 58, Column 35, Lines 35 – 68, and Column 36, Lines 39 – 68). It would have been obvious at the time of applicant's invention, to combine Hou of teaching step of forming said active region comprises forming a plurality of gain separate quantum wells that operate quasi-independently over temperature to provide a dominant portion of said stimulated emission at aid cavity wavelength at a predetermined temperature range within said extended temperature range with surface emitting laser because the gain of each of said quantum wells is optimized to operate quasi-independently at different temperatures such that stimulated emission is dominated by a different quantum well at different temperature since all the lasers with a large wavelength span share the same active region of the quantum wells, the optimum operating temperature for each element is very different. These results in a very narrow temperature region of the quantum wells, the optimum operating temperature for each element is very different. This results in a very narrow temperature region within which the operation of all the lasers can be achieved.

Regarding claims 17 and 19, Jewell disclose the step of forming a plurality of gain separate quantum wells comprises forming a plurality of quantum wells (see Fig. 9b and 10b, Characters 126, and 128) having varying thickness (Figs. 1 – 11, Column 6, Lines 38 – 58, Column 17, Lines 19 – 29, Column 19, Lines 26 – 46, Column 35, Lines 35 – 68, and Column 36, Lines 39 – 68).

Regarding claim 18, Jewell disclose a plurality of quantum wells having varying thickness comprises varying the thickness of said quantum well so that each well orb dominates operation of the surface emitting laser over a predetermined temperature range (Figs. 1 – 11, Column 6,Lines 38 – 58, Column 35, Lines 35 – 68, and Column 36, Lines 39 – 68).

Regarding claim 20, Jewell disclose the step of forming a plurality of quantum wells having varying gain enhancement factor comprises varying the gain enhancement factor of said quantum wells so that η is substantially constant over temperature (Figs. 1 – 11, Column 6,Lines 38 – 58, Column 35, Lines 35 – 68, and Column 36, Lines 39 – 68).

Regarding claim 21, Jewell disclose an extended temperature range vertical cavity surface emitting laser (VCSEL), comprising: a first mirror (see Fig. 9a, Character 102);an active region (see Fig. 9a – 10b, Character 110) on said first mirror, said active region being configured to provide a substantially constant stimulated emission at a cavity wavelength over an extended temperature range, said active region comprising a plurality of gain separated quantum wells each respectively configured to have a predetermined gain peak wavelength offset form said cavity wavelength, said a plurality of gain spattered quantum wells each respectively providing a dominant portion of said stimulated emission at said cavity wavelength at a predetermined temperature range

within said extended temperature range such that said VCSEL operates with a substantially constant stimulated emission at said cavity wavelength over said extended temperature range (see Fig. 9a Character 116) on said active region (Figs. 1 – 11, Column 6,Lines 38 – 58, Column 35, Lines 35 – 68, and Column 36, Lines 39 – 68). It would have been obvious at the time of applicant's invention, to combine Hou of teaching gain separated quantum wells each respectively providing a dominant portion of said stimulated emission at aid cavity wavelength at a predetermined temperature range within said extended temperature range with surface emitting laser because the gain of each of said quantum wells is optimized to operate quasi-independently at different temperatures such that stimulated emission is dominated by a different quantum well at different temperature since all the lasers with a large wavelength span share the same active region of the quantum wells, the optimum operating temperature for each element is very different. These results in a very narrow temperature region of the quantum wells, the optimum operating temperature for each element is very different. This results in a very narrow temperature region within which the operation of all the lasers can be achieved.

Regarding claims 22, 24, 26 and 28, Jewell disclose quantum wells are gain matched such that the fraction of carrier contributing to stimulated emission is substantially constant over time and first group of wells comprising a first number of wells provides a dominant portion of stimulated emission at a high operating

temperature, and a second group of wells comprising a second number of wells provides a dominant portion of stimulated emission at a low operating temperature, and wherein the firs number of wells is greater than the second number of wells. It would have been obvious at the time of applicant's invention, to combine Hou of teaching gain separated quantum wells each respectively providing a dominant portion of said stimulated emission at aid cavity wavelength at a predetermined temperature range within said extended temperature range with surface emitting laser because the gain of each of said quantum wells is optimized to operate quasi-independently at different temperatures such that stimulated emission is dominated by a different quantum well at different temperature since all the lasers with a large wavelength span share the same active region of the quantum wells, the optimum operating temperature for each element is very different. These results in a very narrow temperature region of the quantum wells, the optimum operating temperature for each element is very different. This results in a very narrow temperature region within which the operation of all the lasers can be achieved.

Response to Arguments

Applicant's arguments filed 10/9/2003 have been fully considered but they are not persuasive. Applicant's arguments with respect to claims 1 – 28 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Delma R. Flores Ruiz whose telephone number is (703) 308-6238. The examiner can normally be reached on M - F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Ip can be reached on (703) 308-3098. The fax phone number for the organization where this application or proceeding is assigned is (703) 308-7722.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 306-3431.

Delma R. Flores Ruiz
Examiner
Art Unit 2828
DRFR/PI
November 28, 2003

Paul Ip
Supervisor Patent Examiner
Art Unit 2828